Key Accomplishments
In Water Quality Research from 1995-2005
January 9, 2006

LTG 3	RESTORATION
LTG 3	**Concentrated Animal Feeding Operations (CAFOs) – Releases Control**
2002	Report to the Office of Water concerning the risk presented by CAFO related pathogens. This internal report (in the form of a memo) was submitted to the Office of Water in support of their development of the 2002 NPDES "CAFO Rule".
2004	*Risk Management Evaluation for Concentrated Animal Feeding* Operations. This document assessed the current state of the art in managing environmental pollution from CAFO operations. It informs ORD's CAFO research and is expected to be used as a resource for Agency decision makers.
2004	*A Strategy to Evaluate BMP Performance via Molecular Biology Methods in Watersheds Impaired by Fecal Contamination*. This document discusses a method for evaluating the effectiveness of riparian buffers for attenuating non-point source pathogen contamination from manure-applied fields.
LTG 3	**Controlling Non-Point Source Releases of Major Pollutants**
2002	Workshop on the State of the Art of Suspended and Bedded Sediments Management (Proceedings are in the process of being published as an EPA report). This workshop brought together experts in the various disciplines associated with sediment management and mitigating the effects of excess sedimentation in watersheds. This workshop informed ORD sediments research planning.
2004	*Stormwater Best Management Design Guide* -This three-volume design manual addresses factors that should be considered in the BMP design, with a focus on specific design guidance for the three most commonly used structural treatment BMPs.
2004	Development of a Method for evaluating BMP effectiveness based on the use of flow duration curves. This method allows for the determination of stressor loadings based on commonly available data and allows for the prediction of the conditions under which established limits (e.g. TMDLs) may be exceeded. Being used by state of Kansas.
2005	*The Use of Best Management Practices (BMPs) in Urban Watersheds* –Summary description of the current state-of-the-art of BMP application in urban watersheds. The reference is used by many municipal stormwater management programs as a guide. Kansas City, Missouri is designing their entire stormwater management program based upon the recommended strategies and protocols.
2005	Experimental Stream Facility (ESF) – Initiated lease at a unique research facility that is set-up to balance the controlled conditions of the laboratory with the variability of the natural environment required to develop scalable models of the linkage between chemical based water quality standards and small stream biotic assemblages.
2005	Modeling framework to optimize the placement of BMPs within a watershed. Through the use of Monte-Carlo analysis, it is possible to obtain reliable analyses with minimal data and with data of unknown quality. This accomplishment is essential for the success of TMDLs, trading programs and other strategies for reducing stressor loadings because it accounts for the importance of location in determining the overall effect that use of a BMP has on water quality.
LTG 3	**Ecological Assessment & Benefit Analysis**
2003	*Integrating ecological risk assessment and economic analysis in watersheds* - Presents three watershed-level ecological risk assessments, followed by economic analyses, to improve environmental management in watersheds.

2004	*Ecological Benefits Assessment Strategic Plan.* SAB Review Draft. The Plan describes the ecological and economic evaluation approaches currently used at the Agency and proposes a more integrated process for assessing ecological benefits. A number of actions are presented that could help the Agency improve its ability to identify, quantify, and value the ecological benefits of its activities.
2005	*Economics and Ecological Risk Assessment: Applications to Watershed Management.* Focusing on real-world decisions, this book makes several contributions to environmental management, including placing economic analysis into a context familiar to risk assessors, using the risk assessment perspective to challenge economists to translate risk statements into terms amenable for economic analysis, and introducing a conceptual approach for integrating economics and ecological risk assessment in the context of watershed management.
LTG 3	**Forecasting Effectiveness of Management Alternatives**
2002	A new hydrodynamic and sediment transport model was developed for the HSPF (Hydraulic Simulation Program-Fortran) model which makes HSPF more versatile and comprehensive for evaluating sediment transport within stream/river networks.
2002-2004	Landscape characterization tools and models (ATtlLA and AGWA) incorporated into OW's BASINS (Better Assessment Science Integrating Point and Nonpoint Sources) modeling framework for more targeted, efficient condition assessment and forecasting. ATtILA (Analytical Tools Interface for Landscape Assessments) is a GIS extension that calculates many commonly used landscape metrics. AGWA (Automated Geospatial Watershed Assessment) incorporates spatial data sets into KINEROS (Kinematic Runoff and Erosion Model) and SWAT (Soil and Water Assessment Tool) models.
2003	New sediment transport model GSTAR-1D (Generalized Sediment Transport for Alluvial Rivers) and modified sediment transport model EFDC (Environmental Fluid Dynamics Code) for more accurate State/Region TMDL sediment load allocations – GSTAR-1D is a one-dimensional hydraulic and sediment transport model for use in natural rivers and manmade canals. EFDC is a three-dimensional hydrodynamic model that is capable of simulating the transport of both cohesive and non-cohesive sediments in estuaries, rivers, reservoirs and coastal seas, and is also a mobile boundary model.
2004	LIPS-MACS (Landscape Indicators for Pesticides Study – Mid-Atlantic Coastal Streams) Developed landscape indicator models for pesticides, nutrients, and toxic chemicals in stream water and sediments within the coastal plain. Used to evaluate existing sampling programs and/or to plan future programs that are specific to the areas predicted to have higher concentrations.
2005	"Automated GIS Watershed Analysis Tools of RUSLE/SEDMOD Soil Erosion and Sedimentation Modeling" - new soil and landform metrics for landscape modeling. Significant improvement in computing erosion and sedimentation estimates for large regions, leading to improved estimates for soil loss and sedimentation, important to water quality assessments such as the Total Maximum Daily Load process.
Ongoing	Watershed & Water Quality Modeling Technical Support Center to support water resource managers with TMDL allocations and water quality assessment, diagnoses and forecasting.
LTG 3	**Urban Wet Weather Flow - Problem Characterization and Research Vision**
1996	*Risk Management Research Plan for Wet Weather Flows (WWF)* - Has been an important influence on ORD's research direction on developing better risk management decision-support tools and WWF control measures.
2003 & 2004	Peer-reviewed State of the Science Documents on Water Quality Management of Five Key Stressors – nutrients, sediments, toxics, flow, and pathogens.
LTG 3	**Urban Wet Weather Flow - Control Technologies**
1996	Swirl Technology -The research developed design, evaluation, and application practice enhancements for the use of swirl/vortex technologies, which are widely used as part of combined sewer overflow (CSO) and stormwater pollution control systems.

1999	*Stormwater Treatment at Critical Areas: The Multi-Chambered. Treatment Train (MCTT)* - The MCTT is treatment system, that provides pollution control at isolated, critical ("hot-spots") locations. It has been used for stormwater pollution control by Milwaukee and Minaqua, Wisconsin and by CALTRANS in California.
2000	*Evaluation of Street Storage System for Control of Combined Sewer Surcharge*
2000	*Evaluation of Retrofitting Control Facilities for Wet-weather Flow* - Feasibility and cost effectiveness of 13 separate retrofit approaches and demonstrated that, in most cases, retrofitting existing facilities can be technically feasible and cost-effective,
2002	Critical reviews of five disinfection technologies applicable to CSO. –Based on ORD pilot studies the results were used to plan multi-million dollar improvements to the New York City's CSO facilities.
2003	Patent: "System and Method for Vacuum Flushing Sewer Solids" for sewer sediment control**.**
2003-2005	WWF Environmental Technology Verifications (ETV) - The ORD Water Quality Protection Center conducted verification assessments on WWF innovative monitoring and control technologies, by collecting effectiveness data.
2004	*Sewer Sediment and Control: A Management Practices Reference Guide* **–** This guide helps municipalities in their efforts to protect receiving waters and maintain the structural integrity of their sewers.
LTG 3	**Urban Wet Weather Flow - Stormwater Runoff Modeling**
1999	Stormwater Management Model (SWMM) - One of the most successful models produced for the water environment. SWMM is widely used throughout the world to analyze quantity and quality problems related to stormwater runoff, combined sewers, sanitary sewers and other drainage systems in urban and non-urban areas.
2004	SWMM5 – New version of SWMM that is compatible with current computational technology and a system that is more accessible for updating by the current generation of modelers
LTG 3	**Urban Wet Weather Flow - Outreach and Technology Transfer**
1997 to Present	Website **–** The website provides rapid, free access to the user community to ORD WWF-related research.
2000	*Innovative Urban Wet-Weather Flow Management Systems* - A book co-edited by ORD that outlines the principles of sustainable urban water management and describes innovative methods to improve these systems.
2002	*Stormwater Effects Handbook: A Toolbox for Watershed Managers, Scientists and Engineers* – A book that provides a logical approach for an experimental design to determine if stormwater runoff is causing adverse effects and beneficial-use impairments in local receiving water.
2003	*Management of Combined Sewer Overflows* - The book is a reference for the user community faced with the challenges and mandates to combat urban wet-weather induced water pollution.